

of the pinnae, as it is not easy to separate them from the leaves, and I have not yet seen an entire specimen.

*Mertensites crenata* (nobis). Pl. I. fig. 3.

Segments of the pinnae crenato-lobate and rather broader than those of *M. hantoniensis*.

This species is much rarer than the preceding. I have a specimen which indicates a pinna 4 inches broad. It seems to be altogether on a larger scale than *M. hantoniensis*.

Crozier and fragments of stipites belonging to one or other of these species have been found; the stipites would indicate a fern probably 4 to 5 feet in length.

I hope at some future time to obtain specimens which will enable me to determine the rarer forms, figs. 4 *a, b*, and 5. All that I can say of them is that fig. 4 seems to be allied to *Lindsaea* or *Adiantum*, and fig. 5 to some genus of *Cyathea*.

#### EXPLANATION OF PLATE I.

Fig. 1 *a*. Part of pinna of *M. hantoniensis*, showing the venation.

1 *b, c, d, e*. Ultimate branches, showing the habit of growth.

1 *f, g*. Fructification. (1 *g* is enlarged.)

Fig. 2. Stipes of *Mertensites* (reduced one-half).

Fig. 3. Part of pinna of *M. crenata*.

Figs. 4 *a, b*. *Adiantum*?

Fig. 5. *Cyathea*?

#### IV.—Investigation of the Freshwater Crustacea of Belgium.

By FÉLIX PLATEAU. (First Part.)\*

THE study of the little freshwater Crustacea, already carried so far by Müller, Jurine, and Straus, was resumed in 1837 by the English zoologist Baird, who extended the circle of our knowledge with regard to them, and set himself to describe the species (especially of the genus *Cypris*) which are met with in England.

I have made some investigations of the same kind in Belgium, which, wedged in between France, Holland, and Germany, has a fauna partaking of those of these three countries, and consequently very rich.

The present memoir, which is only the first part of my work, contains the results of my anatomical and physiological observations upon the genera *Gammarus*, *Lynceus*, and *Cypris*, as also a list of the species of these genera which are met with in Belgium. In this summary I shall leave this list unnoticed. I may state, however, that the number of species which it contains is distributed as follows:—three for the genus *Gammarus*,

\* For this abstract, as also for a copy of the original memoir, from "Tome xxxiv. des Mémoires couronnés publiés par l'Académie de Belgique," we are indebted to the author.—W. F.

six for the genus *Lynceus*, and twenty-three for the genus *Cypris*; and among these last a species which I believe to be new, and for which I propose the name of *C. quadripartita*.

As regards my anatomical and physiological researches, the following are the results which I consider new.

*Gammarus puteanus*, Koch, is, as is well known, a singular animal, which lives exclusively in subterranean pieces of water, and its eyes are rudimentary and destitute of pigment. I have made some experiments on the sensibility of the eyes of *Gammarus puteanus*; and it appears from these experiments that light hurts them, as is the case in nocturnal animals, and that the *Gammarus* even flies from diffused light, taking refuge under the shadow of opaque bodies which may be offered to it for this purpose.

Since the time of Müller the genus *Lynceus* had never been the subject of any general work. I have taken up the anatomical study of these little animals, paying particular attention to the facts neglected by Müller and other authors. In my memoir I pass in review:—1. The form of the antennæ of the first and second pairs; the latter do not originate here, as in the *Daphniæ*, from the outer sides of the head, but beneath the margin of the beak. 2. The form of the body, properly so called, which includes only seven segments. 3. The structure of the rudimentary eye or black point, and of the true eye. I show that the true eye, contrary to what is stated in this respect by Rathke with regard to the *Daphniæ*, is at first represented in the embryo by a pigment-mass supporting a sort of entire nucleus; the mass and nucleus divide into two distinct parts, and by their subsequent development become reunited by their inner faces. 4. The digestive apparatus: the maxillæ of the *Lyncei* are triturant, and bear a crown of conical asperities; the digestive tube is not uniform in the greater part of its extent, but we find in it an œsophagus, a first dilatation into which opens a diverticulum corresponding to the cæca of the *Daphniæ*, a large sac with glandular walls, which I shall call the stomach, a slender intestine forming several convolutions, already represented by Müller, and, finally, a straight large intestine inflated like the colon in man. 5. The feet, or respiratory limbs. The limbs of the *Lyncei*, in addition to the antennary rami, consist of five pairs, which, however, are far from being constructed upon a uniform plan; they may be divided as follows:—natatory feet with a rudimentary respiratory vesicle, and furnished with a flat disk for striking the water; feet destined to produce a current of water between the valves, also with rudimentary respiratory vesicles, but furnished with long, rigid setæ; and exclusively respira-

tory feet, with enormous respiratory vesicles, and with scarcely any setæ. 6. The male and female reproductive apparatus. I have discovered the male of *L. trigonellus* and rediscovered that of *L. lamellatus*; they differ from the females by their smaller size, their more elongated body, and by the considerable size of the antennæ of the first pair. The essential part of the reproductive organs consists of a membranous sac on the inner surface of the penultimate joint of the tail, containing two sacciform glands, slightly constricted in the middle, and each furnished with a wide and short excretory duct; these two ducts open at the base of the caudal lamina. Spermatozooids are frequently met with in the fecundated females; these are, like those of the *Daphniæ*, fusiform bodies with a membranous border. The female apparatus of the *Lyncei* greatly resembles that of the *Daphniæ*; the winter eggs, which the incubatory cavity contains at certain periods of the year, are not enclosed in a common *ephippium*, but there is a membranous capsule or distinct *ephippium* for each egg.

Straus Dürkheim, in a memoir which has justly become celebrated, has given in much detail the anatomy of *Cypris fusca*; but he had never seen anything but ovaries in the individuals which he examined, which led him, like Ramdohr, Treviranus, and many others, to regard the *Cyprides* as hermaphrodites. In 1850, M. Zenker indicated the existence of distinct males. In 1854 he described in detail their sexual organs—consisting of two testes represented by masses of cæcal tubes, of two cylindrical glands of very complicated structure (*glandulæ mucosæ*), the secretion from which serves to form the spermatophores, and, lastly, of two corneous sacs, enclosing a corneous penis and hooks, or excitative organs, which are also corneous.

Having myself rediscovered the males of *Cypris monacha*, and studied great numbers of the females and young of other species, I have been able to verify most of M. Zenker's observations, and to add some new facts to those made known by him.

These new facts are as follows:—The mucus-glands of the male *C. monacha*, contrary to what is stated by M. Zenker, present a temporary sacciform prolongation, which is sometimes found filled with spermatophores. The place of formation of the spermatophores is not the deferent canal of each testis, but the central canal of the corresponding mucus-gland. The free spermatozooids (that is to say, destitute of the envelopes of the spermatophore) may be classed in two groups: those of the first group are filiform, without dilatation of any kind; and those of the second, which are met with in *C. ovum*, and perhaps in *C. punctata*, are furnished at one of their extremities

with an inflation, which is constricted in the middle and set on at a right angle upon the principal stem, like the handle of a walking-stick. The copulation of the *Cyprides* appears to take place in the mud. M. Zenker has described, in the females, two pyriform sacs (*receptacula seminis*) in which the spermatozoids are stored up; these, according to him, communicate by two excretory canals with the oviducts. According to my observations, the canals in question simply open at the base of the tail.

Although the young *Cyprides* undergo no metamorphosis like those of a great number of other Crustacea, I have found that the form of the valves in the young of many species is the opposite of that observed in the adults.

Bosc and Straus succeeded in keeping *Cyprides* in wet mud for a period of time which they do not particularize. I have repeated the same experiment, and found that this time did not exceed eight days, and that many other small aquatic animals, such as *Cyclops*, *Hydrachna*, *Nais*, and the larvæ of Diptera, possessed the same power of resisting for a long time a nearly complete privation of water.

V.—Description of a Siliceous Sand-Sponge found on the South-east Coast of Arabia. By H. J. CARTER, F.R.S. &c.

*Tethya dactyloidea* (mihi).

Mammilliform, elongated, date-shaped, fixed, erect, fleshy, tough; surface smooth above, becoming hispid with recurved spines below; colour reddish brown, purplish. Upper extremity obtuse, round, perforated at the point by a circular aperture or vent separated into five divisions by as many septa extending from the circumference to a central union. Lower extremity terminating in a bundle of loose, soft, spiculiferous, keratose filaments, which, tending to a spiral arrangement, finally spread out root-like into the sand beneath. Hollow internally for the purpose of receiving the contents of the excretory system of canals, which, ramifying through the cortical fleshy body, thus empty themselves into the cloacal cavity, somewhat constricted at the vent, already described. Spicules fusiform, pointed at each end, or with one extremity terminating in a trifid extension. Body of sponge  $1\frac{4}{8}$  inch long and  $\frac{6}{8}$  inch broad; pedicel 1 inch long.

*Hab.* Sea, south-east coast of Arabia, in shallow sandy bottom near shore.

*Obs.* This is a siliceous sponge growing erect on the sand,